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SUPPLY STOCKAGE POLICY MASTER PLAN(U) AIR FORCE
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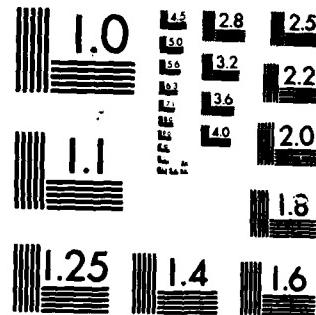
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INVENTORY

**SUPPLY STORAGE POLICY
MASTER PLAN**

AUGUST 1984

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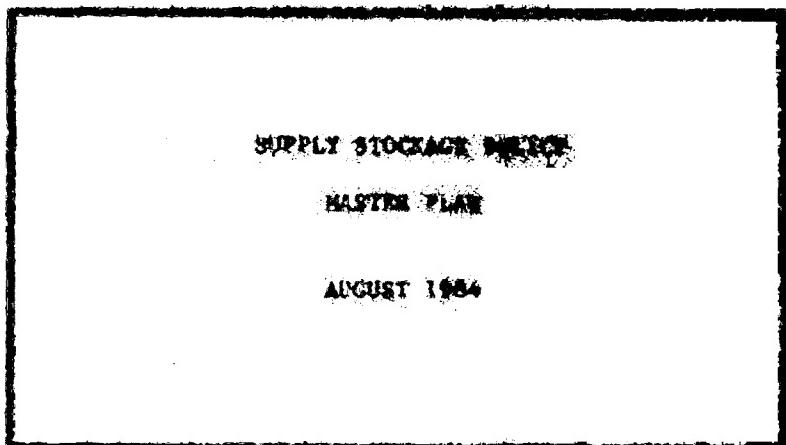
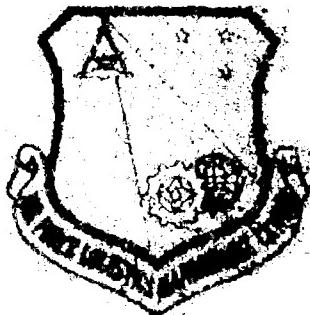
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AFLMC SUPPLY STOCKAGE POLICY

MASTER PLAN

"If you don't know where you are going, any direction you take is fine."

INTRODUCTION

The above quote seems especially applicable to the decisions facing Air Force supply stockage policy decision makers. There are many paths to take. Here are some examples. The Air Force Logistics Management Center (AFLMC) is concentrating on base-level stockage policy for consumables. The Data Systems Design Office (DSDO) is working to implement new hardware. The Department of Defense (DOD) is providing long-range plans to determine, forecast, and report requirements based on weapon system availability. The Air Staff has 43 Harvest Resource initiatives, and AFLC is developing tools to centrally determine stockage requirements. Include the Pacific Logistics Support Center, Europe's Distribution System, TAC's Combat Oriented Supply System, and numerous other initiatives, like the Civil Engineering Materiel Acquisition System, and you begin to get a perspective of the myriad of paths possible.

The Air Force Logistics Management Center's role is to conduct the research necessary to examine and recommend improvements to base level stockage policy. We will examine stockage policy from cradle to grave. In order to ensure a coherent whole for base level stockage policy, we have developed a Logistics Management Center Master Plan. The LMC master plan will:

- a. Let the Air Force Stockage Policy community know what we are capable of doing and what we are doing thereby avoiding duplicate research.
- b. Establish the Logistics Management Center as a focal point for conducting base-level stockage policy research. Thus the LMC would coordinate or direct research for:
 - (1) HQ USAF/LE
 - (2) AFIT
 - (3) AWC
 - (4) ACSC
 - (5) Civilian Academic Community
 - (6) RAND
 - (7) Other DOD logistics research agencies (i.e., Army, Navy)
- c. Insure a systematic approach to solving AF stockage policy projects.
- d. Provide resource and workload planning for AFLMC/LGS. Attached is the AFLMC stockage policy master plan. We divide the projects both chronologically and by major area.

We have divided the projects into four main areas (see Figure 1), requirements determination, base-depot interface, aggregate management and productivity improvements. These four areas can be placed along two levels, management and inventory. We further divide management into two different sub-areas. One is the operational sub-area where decisions are programmable and can be made at the lowest levels; the other is the strategic and managerial sub-area, where the decisions require human judgment and must be made at higher levels in the organization. The inventory level is either base (retail) or a higher level of inventory (depot or Air Force-wide). Also, note that within the base operating level two main areas are found: Requirements Determination and Productivity Improvement.

**AFLMC STOCKAGE POLICY
MASTER PLAN**

		Base (Retail)	Air Force (Wholesale)
		AGGREGATE MANAGEMENT	AGGREGATE MANAGEMENT
L E V E L		Supply Analysis System Architecture	Reporting and Performance Measurement System Architecture
S	Strategic and Managerial	REQUIREMENTS DETERMINATION	BASE-DEPOT INTERFACE
F		<u>Consumables</u> <u>Reparables</u>	Depth Contingency AWP
M		Range Depth Contingency	
A		PRODUCTIVITY IMPROVEMENT	
N			
E			
G			
E			
M			
E			
N			
T	Operating Level		

INVENTORY LEVEL

Figure 1

The first area is requirements determination (see Figure 2). Inventory policy boils down to a question of how much to stock and when to stock it. These questions are even more important for wartime needs. Therefore our first category seeks to answer the inventory policy questions for both peace and war.

REQUIREMENTS DETERMINATION
(BASE)

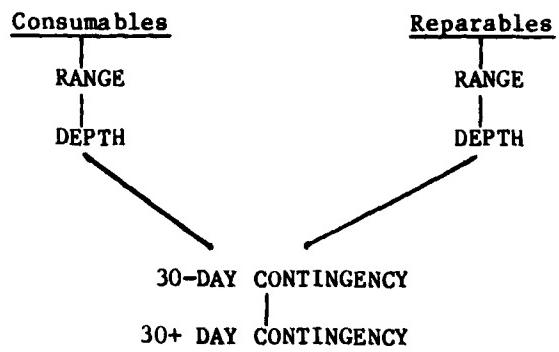


Figure 2

The second area is base-depot interface (see Figure 3). The projects in this general area examine the entire Air Force supply system and attempt to determine requirements on a system-wide basis.

BASE-DEPOT INTERFACE

<u>Consumable/Field Repairable Items</u>	<u>Depot Repairable</u>	<u>Systems Viewpoint</u>
Depth Contingency	Depth Contingency	Awaiting Parts

Figure 3

The third area is aggregate management (see Figure 4). The projects in this area attempt to provide the tools necessary for inventory managers to manage supplies either at the Chief of Supply (base) level or the Air Force-wide level.

AGGREGATE MANAGEMENT

Base Level

Supply Analysis

Statistical Performance Measures

Manpower Model

Systems Architecture (Base Level)

Air Force Level

Reporting and Performance Measurement

Systems Architecture (Air Force Level)

Figure 4

The final area is productivity improvements (see Figure 5). There are many areas where efficiency can be improved in base level inventory management; either through automation, new technology or new procedures.

PRODUCTIVITY IMPROVEMENT

Automate Operational Level Decisions

Materiel Requirements Planning

Figure 5

MASTER PLAN

I. REQUIREMENTS DETERMINATION.

A. Economic Order Quantity (Consumable Items)

1. Depth. The term depth refers to how much to stock at base level. The current system uses the Wilson Economic Order Quantity (EOQ) to determine the operating level and standard continuous review inventory theory to determine the reorder point. In this general area we examine each of the variables used to determine the depth of stock. We will review the assumptions inherent in the measurement of these variables, and where appropriate, correct any invalid assumptions. We have completed many of the projects in this area and recommended significant stockage policy improvements. As a result of implementing the results of these projects, we expect an increase in the number of aircraft mission capable hours of nearly 2.5 million hours which will result in a 3% increase in the mission capable rate from 68.2 to 71.2%. Specific projects and their projected completion date are shown below.

a. EOQ Cost Variables (Completed): We updated the variable costs used to compute the Economic Order Quantity for consumable items and determined the impact of changing the variables. The results of this project are scheduled to be implemented in July 1984 and will result in 2.5% decrease in the number of grounding incidents.

b. Demand Forecasting (Completed): We evaluated alternative methods to compute both the average and variance of demand. Improvements were recommended in measuring the variance of demand and using the improved estimate in the safety level quantity. The results of this project are scheduled to be implemented in September 1984 and will result in a 4.5% decrease in the number of grounding incidents.

c. Order and Ship Time (Completed): We compared alternative means of estimating the average and variance of order and ship time. The results of this project were included in the demand forecasting study and are scheduled for implementation this summer.

d. Local Purchase Order and Ship Time (August 84): We will compare alternative methods to compute order and ship time for local purchase items.

e. Alternative Depth Models (August 84): There are many methods to determine inventory policy: how much to order and when to order. We will examine 10 alternative methods and compare them to the current SBSS model.

2. Range. Range refers to when to stock items at base level. This includes when to start and when to stop stocking an item. We analyze this area to review the assumptions of the current system and to determine if we should stock essential items sooner and longer. The single biggest cause of MICAP incidents in the Air Force is first-time demands at a base (cause code A). Note this includes non-aircraft weapon systems. We are analyzing to

determine whether centrally collected demand data for essential items will help in forecasting a grounding incident, thereby allowing the item to be stocked and prevent a MICAP. The current system also excesses (and many times disposes of) assets after a period of one year without a demand. Analysis indicates many items are disposed of only to have a subsequent demand. We are analyzing methods to forecast subsequent demands, and to keep these items longer. Individual projects include:

a. EOQ Excess (August 84): Currently EOQ items are disposed of too soon, as shown in a SAC study and by the AF IG team. Our study is to establish other rules for determining when an item is excess and when an item should be disposed of.

b. Item Essentiality (Sep 84): We identify a technique to code EOQ items that can cause grounding incidents and significant high-priority parts shortages. Once the items are identified, we describe ways to improve stockage for the essential items.

c. Proactive Forecasting (Sep 84): The biggest cause of grounding incidents, especially for low-density equipment, is first-time demand or insufficient demands to generate a demand level (cause code A and B respectively). Through central demand data collection, we want to see if grounding incidents at one base can predict demands at another base.

d. EOQ Range Model (Oct 84): As part of the EOQ excess project, we identified apparent weaknesses in the current range model. We will examine, in this project, the sensitivity of the range model to certain variables (i.e., demand, backorder cost) and recommend changes as appropriate.

B. Reparable (Investment Spares) Items

1. Depth. We will examine the depth of stock for repairable items. In order to determine the operational impact of changes to the current demand level, a simulation model replicating base-level repairable processing will be developed. The simulation model will include centrally determined demand levels, computation of repair cycle time, aircraft availability and awaiting parts (AWP) bin and piece stockage. We will analyze the assumptions used to compute the variables driving the repairable demand level. Individual projects include:

a. Development of the Repairable Simulation Model (Aug 85): Develop the capability to simulate the SBSS repairable stockage policy and processes. Once built, the model will be used to evaluate alternative stockage policy for repairable items.

b. Field Level Repairable Items (XF3) Analysis (Completed): We examined the impacts of adding an EOQ operating level to selected XF3 assets. The results showed significant improvement in stockage and operational performance. The results of this project will be a 7% decrease in the number of grounding incidents caused by XF3 items.

c. Demand Forecasting (Oct 85): Upon completion of the repairable simulation model, we will examine alternative methods to compute the average and variance of demand for repairable items.

d. Repair Cycle Time (Oct 85): Determine the impact of alternative methods of computing repair cycle time. Additionally, we will examine the difference in the measurement of repair cycle time between the wholesale and retail activities and determine the impact of these differences on stockage.

e. Aircraft Availability (Aug 85): Part of the repairable simulation model will include program logic to determine requirements via maximizing aircraft availability. We will examine this method to compute requirements and compare it to the current system.

2. Range. The determination of when to stock reparables will be analyzed. Currently stockage is the same for any repairable item; items that will ground an aircraft are stocked the same time as items that will not ground an aircraft. Inspector General reports indicate we are disposing of repairable assets, especially field-level repairable items, too soon. We will also analyze changes to the repairable excess policy. The projects for this area are.

a. Range Model (Dec 84): We will examine the method used to determine when to start stocking a field level and non-central leveled repairable item.

b. Excess (Sep 84): We will examine the current method used to determine when to stop stocking a field level repairable item.

C. Contingency

This area involves methods to determine how much to stock, where to stock, and how to distribute stocks to support wartime contingencies. We will analyze existing and alternative support concepts, develop detailed models for determining war readiness spares kits quantities and requirements for follow-on support. Projects include:

1. Logistics Support for Deployed Forces (Oct 84): Examine alternatives to establish the location and level of stock to support a 60-day plus combat scenario. Alternatives include: in-theater staging area, consolidated intermediate repair facility, in-theater depot, or the current system.

2. Contingency Requirements (Nov 84): Evaluate the Combat Follow-On Supply System to determine if established policy will support weapon system requirements following the initial WRSK/BLSS 30-day support period. We will also examine wartime supply requirements for other than weapon system items.

3. Dyna-METRIC (Oct 84): Verify the documentation of the latest version of Dyna-METRIC from RAND. Incorporate any enhancements to the mini Dyna-METRIC model.

4. Combat Supplies Management System (Dec 84): Conduct a functional systems analysis on the Combat Supplies Management System (CSMS). Evaluate data elements and management reports required as well as the system architecture.

5. WRSK Range Criteria (Dec 84): Examine the TAC program, as well as other methods, to determine what EOQ items should be included in a WRSK.

6. Non-Airborne WRSK (Dec 84): Evaluate methods to determine the range and depth of items necessary to support non-airborne weapons systems in a deployed environment.

7. AFCC WRM Program (Oct 85): Evaluate methods to determine AFCC WRM requirements to support low-density communications systems.

II. BASE-DEPOT INTERFACE

This area involves projects to review the current interfaces between base and depot levels of supply. The analysis will examine the stockage of consumable (XB3) and field repairable items (XF3) at both depot and base and examine the assumptions relevant for both. A similar analysis will be conducted for depot repairable items, including central leveled items. Stockage policy and reporting procedures for items awaiting parts (AWP) will also be examined. The goal of this area is to determine the base-level supply and operational impact of depot stockage policy. We will interface with AFLC and DLA on these projects. Individual projects include:

A. Base-Depot EOQ Stockage Policy (Feb 85): Analyze the consistency and applicability of existing stockage policy between levels of inventory management for EOQ items. Determine the base-level supply and operational performance associated with existing and alternative Air Force base-depot inventory policies.

B. Base-Depot Repairable Stockage Policy (Jun 85): Examine the base-depot repairable systems (D002/D028, D041) interface through modeling to see the effect on base-level of: special levels, stockage policy assumptions, and current policy constraints on the D028 system. We will also examine the impact of using aggregated demand data versus individual base-level data. We will examine the supply and operational impact on Air Force bases of stockage policy driven by the central leveling approach.

C. Requirements Determination for Contingencies (Oct 85): This study will examine centralized versus decentralized method for providing combat follow-on support. Real-life scenarios will be used as well as data and processing constraints.

D. AWP (Sep 84): Examine the Air Force Awaiting Parts (AWP) program to determine if current procedures are providing the best possible supply support to the base-level repair program.

III. AGGREGATE MANAGEMENT

A. Analysis/Data Technology. This area involves using microcomputer technology to automate manual processes and files. The goal is to provide decision makers with data and analytical tools. Projects are:

1. Enhanced Stock Fund Management (Jan 85): Apply microcomputer technology to the base-level stock fund program. The project will consider automating the operating program development, tenant operating programs; stock fund trends and indicators.

2. Base Supply Analysis (Dec 85): Introduce microcomputer technology to the base Supply Management Analysis Section for performance of: data storage, data manipulation, data analysis, and graphical depiction of the analysis. Demonstrate the capability to enhance supply management analysis and support decision-making through innovative analysis techniques, improved management products, and current information-processing technology.

3. USAF Supply Analysis (Completed): Develop an analytical framework for use by USAF and MAJCOMs in evaluating stockage policy changes. Objectives of the Supply Analysis Program were to provide a structured approach to the evaluation of supply management data, identify trends, maintain supply performance data for historical and statistical purposes, support simulation capabilities, and determine relationships between supply indicators and operational performance. The AFLMC's data bank of 12 CONUS/overseas bases serve as the source for the Supply Analysis Program.

4. Statistical Performance Measures (Oct 84): There is a need to relate supply performance measures to operational performance or operational hours to supply performance measures. This project will statistically analyze supply and operational data to determine correlation.

5. Manpower Model (Oct 84): There is a need to relate stockage policy and procedural changes to manpower impacts. We built a model that automates the AFMSMET Supply manpower standards and allows us to determine the manpower impact of changes to workload factors.

6. On Going USAF Supply Analysis (Continuing): We will examine performance indicators and trends from the USAF Supply Analysis program and analyze the trends to determine causes.

B. Reporting and Performance Measurement. We derive this analysis area from the DOD Supply Management Policy Group (SMPG). The goal of the SMPG is to determine requirements and report performance against weapon system availability goals. We examine base-level requirements determination techniques based on weapon systems and aircraft availability targets. We also seek to develop performance measures that convert operational performance into supply policy targets. For example, does an 80% aircraft availability convert to a fill rate target or some modified fill rate target? Projects include:

1. Weapon System Availability (Mar 85): We are to examine if determining base level requirements to maximize weapon system availability is feasible for Air Force-wide use.

2. Aircraft Availability (Dec 85): We will examine the effectiveness of determining base-level requirements via aircraft availability. Usually aircraft availability is applied centrally for all aircraft rather than at a base. We will examine the performance of centrally versus locally applied models.

3. Measures of Merit (Jun 85): We will attempt to provide statistically valid measures of supply goals and performance that relate to operational availability.

4. Base-Level Weapon Availability Data System (Oct 85): We will examine the data support system necessary to support weapon systems availability models at base level. This project will include restructuring management reports to depict weapon systems availability and ensuring data elements are collected to support the inventory models (for example quantity per application).

C. Systems Architecture (Base Level). This area will provide base-level managers the necessary technology to "macro" manage an account. For example, what hardware, software, and data will base-level managers need to analyze to effectively manage an account? Projects include:

1. Data Technology (Aug 85): This project will examine and evaluate software packages to analyze base-level supply data (e.g., user-friendly statistical packages to allow supply managers to perform regressions, frequency charts, etc.).

2. Base Level Aggregate Inventory Management (Aug 85): We will provide base-level users the tools and techniques to manage their account. For example, what is the level of support if stock funding is increased for selected essential items?

D. Systems Architecture (Air Force Level). This area will answer the question; what is the best way to compute stockage policy - centralized or decentralized? Should wartime stockage policy be set the same as peacetime policy? Thus centralized versus decentralized contingency requirements determination will also be examined.

1. Centralized Versus Decentralized Stockage Policy (Oct 85): There has been a lot of theoretical and conceptual work done on the advantages and disadvantages of centralized versus decentralized and push versus pull systems. This study will quantitatively examine the advantages and disadvantages of each system and determine the impact of real-life data and policy constraints on both systems.

IV. PRODUCTIVITY IMPROVEMENTS

A. Automate Operational Level Decisions at Base Level. Many decisions at a base supply account are operational level decisions--they are programmable. Because we have not progressed from our Management Information System (MIS) to a Decision Support System, managers have had to manually collect data to make decisions. The current MIS highlights exceptions in reams of reports, but additional data must be collected to make the decisions. Once the additional data is available the decision is straightforward. In other words the computer can make the decision given the appropriate data. We will program these decisions to allow managers to make more important decisions and to increase their productivity. Projects include:

1. Local Purchase Procedures (Sep 84): We will examine: alternative methods of contracting (i.e., blanket purchase agreements, unit small purchase with imprest funds), alternative stockage policy, requirements consolidation in supply or contracting, procedures between supply and contracting, and automation of files between supply and contracting.

2. Special Levels (Dec 84): We will examine the current impact on stockage policy of special levels and the rules governing special levels. We will examine methods to better manage special levels (e.g., identify items without a demand in 2 years for special review). The Air Force Stockage Advisory Board is currently reviewing special level procedures. We will incorporate these new procedures in our analysis.

3. Initial Spares Support Levels (Dec 84): We will review the effectiveness of ISSLs from a stockage policy standpoint. We will examine the building and follow-on "scrub-down" of ISSL's to provide efficient and effective support at the base level.

B. Materiel Requirements Planning. Many inventory situations involve dependent demand. This is where the requirements for components items are known once the end-item requirements are known (e.g., Civil Engineering work orders and phased maintenance). We will attempt to initially develop an MRP system and then export the technology to other applications.

Projects include:

1. Civil Engineering Materiel Acquisition System (Oct 84): Much of the materiel requirements for base civil engineers is in support of work orders, which are the relatively larger jobs requiring planning. Materiel support for work orders is a dependent demand situation, which means materiel requirements planning (MRP) logic is applicable. We will develop an MRP system for BCE use.

2. Materiel Requirements Planning (Dec 85): Assuming the successful implementation of MRP for base civil engineers, we will export the technology to other dependent demand situations (e.g., the Air Force Cryptologic Support Center, base-level phase maintenance, and Air Logistics Centers).

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